

TECHNICAL CHEMISTRY.

- (1) *The Fermentation of Cacao*. Edited by H. H. Smith. With a foreword by Sir George Watt, C.I.E. Pp. lv+318. (London: John Bale, Sons, and Danielsson, Ltd., n.d.) Price 10s. net.
- (2) *Chemistry and its Relations to Daily Life*. By Prof. L. Kahlenberg and Prof. E. B. Hart. Pp. vii+393. (New York: The Macmillan Company; London: Macmillan and Co., Ltd., 1913.) Price 5s. 6d. net.
- (3) *Industrial Poisoning from Fumes, Gases, and Poisons of Manufacturing Processes*. By Dr. J. Rambousek. Translated and edited by Dr. T. M. Legge. Pp. xiv+360. (London: Edward Arnold, 1913.) Price 12s. 6d. net.
- (4) *The Application of Physico-Chemical Theory to Technical Processes and Manufacturing Methods*. By Prof. R. Kremann. Translated from the German by H. E. Potts, and edited by Dr. A. Mond. Pp. xv+212. (London: Constable and Co., Ltd., 1913.) Price 8s. 6d. net.

(1) **T**HIS is a collection of essays published during the last few years in Germany, Holland, the United States, and this country, discussing the methods and effects of fermentation as applied to the preparation of cacao ("cocoa"). Raw cacao beans, on being removed from the pods and placed in covered heaps, undergo alcoholic and acetic fermentation of the adherent pulp. This loosens the testa of the beans, and improves the quality of the kernel by reducing the amount of bitter astringent substances, developing the aroma, and producing the desired chocolate colour. As to how precisely the improvement is effected there is difference of opinion. Oxidation, either direct or by means of an oxidase; the action of acetic acid, or of heat, or of glucoside-splitting enzymes, are some of the explanations put forward.

Two important suggestions for improving the industry are made: one is that instead of trusting to chance to bring the right kinds of yeast, the planter should employ suitable cultures for starting and prolonging the fermentation. A definite culture of yeast would ensure a more uniform product. The second suggestion is that the "juice" from the fermentation, large quantities of which are now run to waste, might be manufactured into vinegar, which should become a considerable asset to the planter.

(2) Theory has been kept down to the minimum in this work, which is intended for students of agriculture and home economics in (American) secondary schools. The authors take common

substances for their material—water, air, vinegar, soda, coal, soap, sugar, clay, wool, bread, milk, and so on. By discussing and experimenting upon these the student is led to a knowledge of some of the fundamental facts of chemistry. The descriptions are simple and interesting; the instruction is sound so far as it goes; and the more important points are emphasised by using different kinds of type in the letterpress. A good deal of life is infused into what many students would regard as the dry bones of chemistry, and many illustrations are provided which further serve to brighten the pages. Students who are not making chemistry their primary study, but desire to have some knowledge of the chemical properties of common articles, will find the book full of trustworthy information.

(3) Dr. Rambousek, a medical man and a chemist, is also professor of factory hygiene and chief State health officer at Prague. He may therefore be regarded as specially qualified to compile a work dealing with the occurrence of poisoning in industrial occupations. The number of such occupations attended with risk is perhaps in general scarcely realised. Thus besides lead and phosphorus poisoning, cases occur in connection with the larger chemical industries (sulphuric acid, bleaching powder, hydrochloric and nitric acids), and with the use of phosgene gas, chloro- and nitro-benzene, methyl bromide, carbon disulphide, aniline, petroleum products; brass, chromates, ferro-silicon, mercury, and nickel carbonyl. The author gives an outline of the dangerous processes, then describes symptoms and treatment, and finally gives an account of the preventive measures hitherto adopted or suggested. The field is so wide that exhaustive discussion within the limits of one small volume is impracticable; but the large number of references supplied will help to remedy this defect.

(4) This work, the English editor explains, is one of a series of monographs on technical chemical methods of manufacture, written by experts and published first in Germany, where they have had an encouraging reception.

The book contains the substance of lectures delivered by Prof. Kremann, whose experience has taught him that the beginner shows most interest in those problems of physical chemistry which have a bearing upon technical questions.

Starting with the fundamental laws of the mechanical theory of heat, the law of mass action is deduced, and the maximum work of a chemical process discussed, the results being then applied to a consideration of the theory of gas engines and of gaseous and solid explosives. The phenomena of catalysis and pseudo-catalysis are next

dealt with, examples of practical application being furnished by the manufacture of sulphuric acid, the Deacon process for chlorine, and the drying of linseed oil. Special cases depending on the law of mass action are found in the production of nitric acid and of ether, and in the caustification of sodium carbonate. The rest of the book is chiefly concerned with applications of the phase rule to manufactures, for example, lime-burning, lead roasting, blast-furnace reactions, and the Solvay ammonia-soda process. Technical chemists and students would often find the book useful and suggestive.

OUR BOOKSHELF.

Meteorological Office. The Observer's Handbook, 1913. Pp. xxiv + 157 + plates. (London: H.M. Stationery Office, 1913.) Price 3s.

THE issue of an annual edition of this work, arranged in 1909, was very appropriate—from a scientific point of view—owing to the rapid advance of meteorological research in recent years. The progress of aerial navigation and the proposed general extension of the centimetre-gram-second system of units to meteorological measurements give greater force to the desirability of the arrangement. The work is divided into four principal sections, most carefully prepared with due regard to requirements of observers and to decisions of international conferences. Part i. relates mostly to normal climatological stations and to non-instrumental observations. The articles referring to modifications of aqueous vapour and to optical phenomena are especially interesting. Parts ii. and iii. deal with self-recording and additional instruments, special attention being given to the attainment of accuracy in their working. Part iv. contains reduction and conversion tables, including those adapted for the c.g.s. system. An introductory memorandum on the proposed new units, to be used for bringing meteorology into line with allied sciences, is most useful. Certainly the learning of them “does involve a definite effort to begin with,” but the proposed regraduation of instruments will, as pointed out elsewhere, probably remove the main objection to the innovation.

Handbuch der Hygiene. Herausgegeben von Prof. M. Rubner, Prof. M. v. Gruber, and Prof. M. Ficker. III. Band 3. Abteilung. Die Infektionskrankheiten. Pathogene tierische Parasiten. (Protozoen, Würmer, Gliederfüssler.) Pp. 392 + plates. (Leipzig: S. Hirzel, 1913.) Price 24 marks.

FOLLOWING upon an introduction of fourteen pages dealing with the general problems of parasitology, the book is divided into three sections dealing with parasitic protozoa (224 pp.), worms (101 pp.), and arthropods (28 pp.), the last section being written by W. von Schuckmann, and the rest of the book by Th. von Wasielewski. Each

section is accompanied by reference to the main literature on the subject of which it treats. The book is excellently illustrated by means of thirty-two coloured plates and 192 text-figures, many of which are original.

The section on protozoa deals in the main with the forms which are parasitic in man, the subjects of trypanosomiasis, leishmaniasis, amœbiasis, malaria, and balantidium-dysentery being treated of at length. A short section deals with organisms doubtfully related to protozoa—*Spirochæta*, *Haplosporidia*, and *Chlamydozoa*. The section on worms also deals mainly with the species which are parasitic in man. Compared with these sections the one on arthropods appears distinctly inadequate, the illustrations being mostly bad and antiquated. The legends to figures of *Hæmatopota* and *Stomoxys* (p. 76) are unfortunately reversed. Due credit is given throughout to the sources whence illustrations are borrowed. An annoying custom in bibliographies to German publications may be noted in that “Ders.” and “Dies.” printed in the same type as authors' names, are used instead of dashes beneath the name or names heading the first title—this is most distracting to the eye.

Prof. von Wasielewski may well be congratulated upon his excellent treatise, which will prove most useful to hygienists, for whom the “*Handbuch der Hygiene*” is primarily intended.

G. H. F. NUTTALL.

LETTERS TO THE EDITOR.

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The Pressure of Radiation.

I QUITE agree with Mr. C. G. Darwin's opinion, expressed in NATURE of January 22, that Boltzmann's proof of the fourth-power law, taken as he gave it, or as it is usually given in the text-books, cannot be applied as it stands to each separate frequency, because the adiabatic expansion, employed in performing the cycle, will bring the Doppler effect into play, and cause a small change in the frequency, thus confusing the issue. But I think the reason of this is that the proofs usually given assume too much, and neglect an essential point, expressly emphasised by Carnot himself in the application of his principle to the case of a saturated vapour. According to my view, the application of Carnot's principle to a single frequency should run somewhat as follows.

Since the emission of radiation of constant frequency, independent of the temperature, is a characteristic property of matter, we are justified, for the purpose of argument, in assuming an ideal cylinder and piston of a material capable of emitting only a single frequency, or a narrowly restricted range. Generate a *finite* volume v of radiation in such a cylinder at a constant temperature T and pressure p . The work done on the piston is $p v$, and the total heat absorbed $E + p v$, where E is the intrinsic energy of the radiation generated. Cool the cylinder at constant volume through an *infinitesimal* range, dT , by abstracting heat $C dT$, where C is the thermal capacity